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**ACQUISITION FAILURE
A CORONER'S REPORT ON THE CAUSE:
NON-AFFORDABILITY**

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AFFORDABILITY IMPACTS ON PROGRAM DECISIONS

ABSTRACT

The National Missile Defense (NMD) Program is the first Ballistic Missile Defense organization (BMDO) program to apply the perspective and use of affordability objectives on a major program. NMD's affordability objective is to acquire the "best value" for the NMD acquisition program. Historical DoD cost data indicates a major weapon system's development cost is approximately 10% of the system's total LCC. From the development phase on, any program is subject to "cost over run," and the attendant misinformation and adverse publicity that could lead to program cancellation. NMD's affordability challenge is to accurately project incremental program cost to accommodate any and all NMD program "unknowns."

OVERVIEW

The foundation of this paper is the analysis of historical program cost data. This review clearly showed many common reasons and a DoD perspective for canceling programs based on "affordability" criteria. The paper then uses this perspective of cancellation for non-affordability to analyze how BMDO could benefit from these lessons learned. The NMD Program will use this cancellation perspective in their plans for affordability objective(s) as a major part of its program to acquire a system-of-systems that represents "best value."

The NMD's Program's mission contains several unique features. The most challenging is for the NMD to provide defense capability against an Intercontinental Ballistic Missile (ICBM) an unknown threat at some future point in time. At the same time, during the design and development of the NMD capability, the program must protect an option to deploy the total system (be ready to) at yet another unknown date. This means satisfying several technical ob-

jectives as well as many affordability goals to accomplish this lofty "be ready to" mission.

NMD's anti-ballistic missile (ABM) mission makes the objective of "affordability" independent of its technical objectives. Yet, over time, several cost figures will surface, depending upon the actual time frame and the National need to deploy a NMD capability. DoD acquisition policies stress program / system development to provide a sufficient capability to meet the worst case threat at the minimum life cycle cost (LCC). Historical DoD data indicates the development costs tend to be approximately 10% of total LCC. Applying this statistic to the NMD program and its "be ready to deploy mission" is not valid.

NMD management wants to project incremental costs into the NMD Program "unknowns" and avoid a "cost overrun" with the accompanying negative publicity. Each increment of the NMD Deployment Readiness development will cost more than the last, due to development of an increased ICBM defense capability. Looking at NMD's ac-

quisition strategy from a positive perspective, the "big 90%" of the LCC is avoided since fielding does not take place.

REASONS FOR AFORDABILITY

Official DoD direction to all Program Managers (PMs) is to consider affordability at each stage of their assigned program. All weapon system's performance and attendant affordability must have a predetermined balance with the other aspects of the program.

A program may not show any affordability stress until it reaches the advanced stages of design. On the other hand, trying to correct long-term affordability issues is extremely difficult in early program deliberations and decisions. Failure to establish initial, early affordability goals and objectives as well as the lack of any policy to make pure affordability and its associated trades part of every decision, exacerbate the problem.

Oddly enough, in the past, the predominant reasons for program cancellation were that considerations of "affordability" were applied as afterthoughts and that evaluators failed to consider affordability as an important source selection criterion. This statement is not a "cheap shot" at PMs or the acquisition process, but a recognition that times have changed.

In the *Army RD&A*, (Jan-Feb 1997), The Honorable Mr. Decker wrote about "PMs-The Heart Of Our Acquisition Reform." He spoke of the tough job each PM has in today's fiscal environ-

ment. Decker went on to say that PMs have the authority and responsibility for all programmatic cost, schedule, and performance decisions. He pointed out that PMs now have direction to consider affordability at each stage of their program. Finally, he stated weapon systems and their affordability are the main job of the PM.

Considering affordability at each separate program stage is not enough, if the affordability focus is only on a particular stage of the program. Affordability starts with the viewpoint of the user and operator, how they see the system, and importantly, how effectively would the system perform as a fielded production item in the hands of typical users. Developers looked for a "best value" industrial partner who could then produce an "affordable item." In the past, it was sometimes misleading when managers based program decisions on the nominal development costs and that day's budget constraints (for a particular program phase). If "getting through" a particular phase was what the Government wanted, and then industry complied.

Thus, a given program might not show any affordability stress until it reached the advanced states of its design. Remember also that during the first or early phases, a program spends only a small proportion or amount of its total LCC. Figure 1 illustrates the life cycle of a typical program and how its various phases relate to the different phases of the system's LCC.

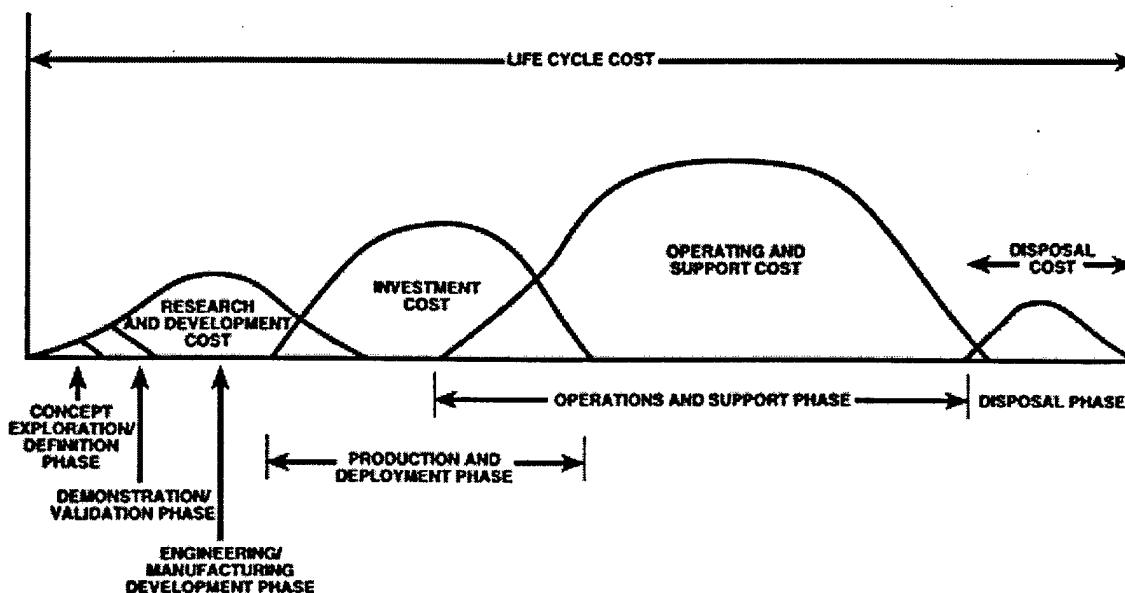


Figure 1 Relationships Of Program Phases and the Phases of LCC

A straight-line projection shows a cost trend line that goes up. Historical records show that sometimes, up to 70% of the out-years years' budgets were committed in the concept demonstration and the demonstration validation phases because, this is when and where the design takes place.

In order to "fix" the specter of a higher LCC, more cost analysis work is needed in the development phase. This in itself could lead to higher than projected development costs. Cost as An Independent Variable (CAIV) requires application on an "all phases" basis. Trying to correct long-term affordability issues is extremely difficult in early phase program deliberations and decisions. Affordability is not just a single important consideration. It is tied to several other considerations in the overall acquisition strategy. CAIV could possibly serve as a centerpiece or connecting link between and during acquisition phases.

Large weapon systems and those systems with undefined architectures,

such as the NMD System, are prone to affordability perturbations and miscalculation in acquisition costs. Criticism of past programs with poorly defined affordability goals contained one or more of the following cause and effect evaluations:

- Ill defined requirements, specifications, and architectures resulting in a lack of a common frame of reference.
- Undefined and changing requirements, resulting in numerous or questionable engineering changes.
- Poorly prepared or understood Requests for Proposals.
- Ineptly executed source selection process and inadequately written evaluation factors.
- Use of unqualified people on source selection teams.
- Failure to fully consider LCC, from development through disposal.
- Lack of incentives to reduce LCC.
- Failure to establish affordability goals and objectives.

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- Lack of DoD and Program Office policy and forcing functions to make affordability and the attendant affordability trades part of every management and technical decision.
- A push for the latest "state of the art" technology rather than the more cost-effective "state of the practice" solutions (e.g., commercial off the shelf, non-developmental items).
- Turnover in program personnel (Government and contractor) resulting in different perspectives and standards for application of "affordability" criteria.
- Built-in program bottlenecks and or institutionally applied specifications, regulations and firewalls and stovepipes (outmoded) that generally neglected acquisition streamlining and constrained the possibility of *ever* meeting reasonable affordability objectives.

APPLYING LESSONS LEARNED TO THE NMD PROGRAM

The NMD Program considered two affordability questions early in its development phase. One is the design and development of the system's initial capability and the other is the possible deployment of undefined, enhanced capability at an unknown time, against a non-quantified future threat. Each affordability consideration depends upon NMD's technical capability, its location(s) and number of NMD sub-systems needed to effectively detect, track and intercept an adversary's reentry vehicle.

Due to the large number of unknowns, the most casual reader can easily see the NMD program committing several, if not all, of the preceding affordability pitfalls.

Intuitively, the best NMD affordability solution is to recognize and structure NMD affordability objectives toward each of the NMD program's operational scenarios. Simply stated, there are several variations of the NMD Program. Without even considering a given NMD architecture that is deployed against a specific threat, these variations include:

- Develop a threat driven ABM capability (limited) and architecture in three years.
- Deploy this capability in less than three years.
- Continue the ABM capability (limited) development to counter more sophisticated threats (builds on #1).
- Deploy the improved (#3) capability in less than three years.
- Repeat options #3 and #4 until the NMD reaches a capability that produces the desired (objective) performance parameters.
- Deploy the objective capability.

Each of these options includes an affordability impact, depending upon the desired outcome. Part of the affordability equation and information depends on making a decision to transition to one of these options. Such a decision requires consideration of NMD's current phase, and the possible next two phases. The affordability equation must also account

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for costs associated with a "continuous possibility" to deploy. Although this cost is significantly less than actual deployment, it nevertheless becomes an "is it affordable" question and its cost is included in the price of doing business.

There should be a 7th deployment option. This option really should be the first consideration. It is, HOW MUCH would it cost and how LONG would it take to develop, produce, and deploy a full capability NMD? The answer to this question would then establish a benchmark set of affordability objectives with at least two priority drivers, one being a National Priority and Goal. The other is a threat driven, risk accepted program to develop and commit to *nothing more* than the objective NMD system.

Since the public's perception of the National need for an ABM capability is split approximately 50/50, the current strategy for a limited near term ABM capability offers greater flexibility for earlier deployment. It also allows avoiding an actual deployment until needed. Finally, this strategy provides

flexibility in adjusting performance parameters to counter the long-term threat.

SUMMARY

The NMD Program Manager's task is still traditional. He has responsibility for cost, schedule and performance. The significant difference is while NMD is one system and program; it is made up of many different systems and programs with individual schedules and technical performance objectives. In effect, for planning purposes, NMD is several programs within a larger program. Each of the sub-programs has its own technical constraints and LCC projections.

In any case, developing an objective NMD capability is significantly less expensive than deployment of any one of the early NMD capabilities and then trying to upgrade the system performance incrementally. Engineering change proposals are not the way to plan for an affordable program.